WHAT IS CLAIMED IS:

1. A system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a plurality of weighting points in a multi-dimensional coordinate space, and the control logic including spline computation logic configured to generate a spline curve based on boundary conditions, wherein the spline curve extends near the weighting points, and wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the spline curve.

2. A system according to claim 1, wherein the spline curve is a Bézier spline curve.

3. A system according to claim 1, wherein the spline curve does not pass through the weighting points.

4. A system according to claim 1,

wherein the spline curve comprises a plurality of spline curve segments;

wherein the control logic determines a starting velocity vector, a starting acceleration vector, an ending velocity vector, and an ending acceleration vector for each of the spline curve segments;

wherein the ending velocity vector and the ending acceleration vector for each of the plurality of spline curve segments are determined so as to be approximately equal to the starting velocity vector and the starting acceleration vector for a next adjacent one of the plurality of spline curve segments.

5. A system according to claim 1, wherein the control signals include position reference values, and wherein the control logic includes an interpolator configured to generate the position reference values substantially simultaneously along a plurality of different motion axes.

6. A system according to claim 5, wherein the interpolator generates the position reference values based on a plurality of coefficient vectors, the

coefficient vectors being coefficients of the spline curve and being determined based on the boundary conditions and the weighting points.

7. A system according to claim 1, wherein the path defined by the spline curve connects first and second additional path segments, the first and second additional path segments being non-tangential.

8. A system according to claim 7, wherein the first and second additional path segments are linear path segments.

9. A system according to claim 7, wherein one of the first and second additional path segments is a linear path segment and the other one of the first and second additional path segments is a curved path segment.

10. A system according to claim 7, wherein the first and second additional path segments are curved path segments.

11. A system according to claim 7, wherein the merging point is derived from the first and second path segment.

12. A system according to claim 7, wherein the spline curve is generated without using characteristics of the first and second path segments other than velocity and acceleration vectors for the first and second path segments at the boundary points.

13. A system according to claim 1, wherein the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

14. A system according to claim 1, wherein the programming interface includes a jog block which permits the user via a jog instruction to specify a new motion axis velocity, a move block which permits the user via a move instruction to specify a new motion axis position, a time cam block which permits a user via a time cam instruction to specify a motion axis position profile which specifies motion axis position as a function of time, a gear block which permits the user

via a gear instruction to specify an electronic gearing relationship between the position of one motion axis and the position of another motion axis, a position cam block which permits the user via a position cam instruction to specify a motion axis position profile which specifies the position of one axis as a function of the position of another motion axis.

15. A system according to claim 1, wherein the system is an industrial control system.

16. A control method for controlling movement of a controlled element in a multi-dimensional coordinate system, comprising:

receiving a plurality of weighting points by way of a user instruction;

generating a plurality of control points for a plurality of adjacent spline segments based on boundary conditions and the plurality of weighting points;

generating a plurality of coefficient vectors for the plurality of spline segments based on the plurality of control points;

generating a first plurality of position reference values based on the plurality of coefficient vectors and using the first plurality of position reference values to control a first motion axis, the first motion axis operating in a first dimension of the multi-dimensional coordinate system; and

generating a second plurality of position reference values based on the plurality of coefficient vectors and using the second plurality of position reference values to control a second motion axis, the second motion axis operating in a second dimension of the multi-dimensional coordinate system.

17. A method according to claim 16, wherein, during movement along the transition path segment, the controlled element transitions from a previous path segment, to the spline path, and then to a next path segment without discontinuities in velocity and acceleration.

18. A method according to claim 16, wherein the plurality of adjacent spline segments form a Bézier spline curve.

19. A method according to claim 16, wherein the plurality of spline segments do not pass through the weighting points.

20. A method according to claim 16,

wherein each of the plurality of spline curve segments have a starting velocity vector, a starting acceleration vector, an ending velocity vector, and an ending acceleration vector;

wherein the method further comprises determining the ending velocity vector and the ending acceleration vector for each of the plurality of spline curve segments are determined so as to be approximately equal to the starting velocity vector and the starting acceleration vector for a next adjacent one of the plurality of spline curve segments.

21. A method according to claim 16, wherein the user instruction is provided as part of a programming interface, and wherein the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

22. A method according to claim 16, wherein the user instruction is provided as part of a programming interface, and wherein the programming interface includes a jog block which permits the user via a jog instruction to specify a new motion axis velocity, a move block which permits the user via a move instruction to specify a new motion axis position, a time cam block which permits a user via a time cam instruction to specify a motion axis position profile which specifies motion axis position as a function of time, a gear block which permits the user via a gear instruction to specify an electronic gearing relationship between the position of one motion axis and the position of another motion axis, a position cam block which permits the user via a position cam instruction to specify a motion axis position profile which specifies the position of one motion axis as a function of the position of another motion axis.

23. A system for controlling a first motion axis and a second motion axis; the system comprising motion control logic configured to control the first motion axis and the second motion axis in accordance with a user program, wherein the

motion control logic provides a plurality of instructions configured for use in the user program, the plurality of instructions including an instruction that permits a move to be specified by specifying weighting points for a spline path to be followed by the controlled element in a multi-dimensional coordinate system that includes the first motion axis and the second motion axis.

24. An industrial control system comprising:

a plurality of input devices;

a plurality of output devices;

a communication network;

a plurality of motion axes;

a plurality of microprocessor-based controllers, the plurality of controllers being coupled to each other by way of the communication network, the plurality of controllers being coupled to respective ones of the plurality of input devices and the plurality of output devices, the plurality of controllers being configured to control the plurality of output devices based on input status information from the plurality of input devices, the plurality of microprocessor-based controllers including control logic configured to control the plurality of motion axes, and the plurality of controllers being configured to be programmed with a user program; and

a programming interface, the programming interface being configured to permit a user to generate the user program, the user program including a user instruction which permits the user to specify a plurality of weighting points in a multi-dimensional coordinate space; and

wherein the control logic includes spline computation logic configured to generate a spline curve which extends near the weighting points, and is configured to generate control signals to control operation of the plurality of motion axes to drive movement of a controlled element along a path defined by the spline curve.